

Spiradiclis yanii (Rubiaceae), a new species from Guangxi, China

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Abstract

Spiradiclis yanii Y.Nong & L.Wu (Rubiaceae), a new species from Guangxi, China, is described and illustrated. This new species is most similar to *S. tomentosa*, but it can be easily distinguished by being densely multicellular villous, leaves narrow elliptic or oblanceolate, apex acute or shortly acuminate, stipules 2–4, linear or linear lanceolate, 4–8 mm, densely villous, corolla tube 3 mm, sparsely pubescent inside, flower homomorphism, lobes 3–5, stamens arising at the base of the tube, stigma 2-lobed, lobes ovoid, slightly swollen, 0.2 mm. The habitat of *Spiradiclis yanii* is extremely fragile. Therefore, this species deserves close attention and protection.

Key words: Longan, limestone, new species, sinkhole, taxonomy

Introduction

Spiradiclis Blume most closely resembles *Ophiorrhiza* L. and the two genera are in the same tribe Ophiorrhizeae, based on morphological characters (Verdcourt 1958; Darwin 1976; Lo 1999; Chen and Taylor 2011; Wu et al. 2019) and molecular evidence (Bremer 2009; Rydin et al. 2009; Wikström et al. 2013). Robbrecht (1988, 1993) accepted earlier conclusions that *Spiradiclis* is related to *Ophiorrhiza*; a more recent study, based on molecular data, suggests that the situation may be more complex and calls into question the separation of these genera (Rydin et al. 2009). Even so, the monophyly of the two genera is questioned (Razafimandimbison and Rydin 2019). However, *Spiradiclis* is morphologically different from *Ophiorrhiza* by its linear-oblong or subglobose capsules with four valves (vs. obcordate and compressed capsules with two valves) when mature. Since the delimitation and relationship of the two genera still need further research, we prefer to accept the traditional concept of *Spiradiclis* here due to its unique capsule form. Subsequently, more than 20 new species of *Spiradiclis* have been discovered in the last decade (e.g. Wang 2016; Zhang et al. 2018; Pan et al. 2019; Tong et al. 2020; Cai et al. 2022).



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During our field surveys in Longan County, Guangxi in March 2024, we found a special *Spiradiclis* population in flower and fruit that was morphologically similar to the species *S. tomentosa* D. Fang & D. H. Qin. However, this special population is distinctly different from *S. tomentosa*, based on being densely multicellular villous, leaves elliptic or oblanceolate, apex acute or shortly acuminate, mid-vein flat adaxially and convex abaxially, stipules 2–4, densely villous. Therefore, we proposed that this special population may represent a new species after we carried out more observations and examining many specimens of *Spiradiclis* from the Herbaria PE, IBK, GXMI and KUN and consulting relevant literature (Lo et al. 1983; Wang 2002; Wang et al. 2015; Wu et al. 2015, 2016, 2019; Pan et al. 2016; Liu et al. 2017; Zhang et al. 2018; Wen et al. 2019; Li et al. 2021; Song et al. 2022). Finally, we carried out one more field survey to confirm that the unusual plant is a species of *Spiradiclis* new to science and we describe it below.

Materials and methods

Morphology

The new species was described, based on field observations that were made in March 2024 and examination of herbarium specimens at GXMI. Other related *Spiradiclis* species were examined, based on online images from the Kew Herbarium Catalogue (<http://apps.kew.org/herbcat/gotoHomePage.do>) and JSTOR Global Plants (<http://plants.jstor.org/>) and PE, IBK and KUN. Morphological characters that distinguish it from all other species in the genus of *Spiradiclis* are used. We also observed living plants of the new species at flowering and fruiting time (March). We observed characters of stems, leaves, pedicels, flowers, receptacles, petals, stamens, gynoecium, carpels, size of flowers, size and shape of petals, number of stamens and the shape of gynoecium and fruit.

Descriptions were written from herbarium specimens. Measurements were made with a tape measure and calipers. The structure of the indumentum and its distribution were observed and described under a dissecting microscope at magnifications of more than 20×. Additional information on locality, habitat, ecology, plant form and fruits were collected in the field and taken from herbarium labels. The conservation threat assessment followed IUCN Categories and Criteria (IUCN 2022).

Results and discussion

Taxonomy

***Spiradiclis yanii* Y.Nong & L.Wu, sp. nov.**

[urn:lsid:ipni.org:names:77350291-1](http://www.ipni.org/names/77350291-1)

Figs 1–4

Chinese name: yán shì luó xù cǎo (严氏螺序草)

Diagnosis. *Spiradiclis yanii* is most similar to *S. tomentosa*, but is different in being densely villous without knots (vs. densely grey-viscid multicellular tomentose); leaves narrow elliptic or oblanceolate (vs. oblanceolate, obovate or rarely elliptic); apex acute or shortly acuminate (vs. apex cuspidate to rounded); mid-vein flat adaxially and convex abaxially (vs. mid-rib and lateral veins nearly

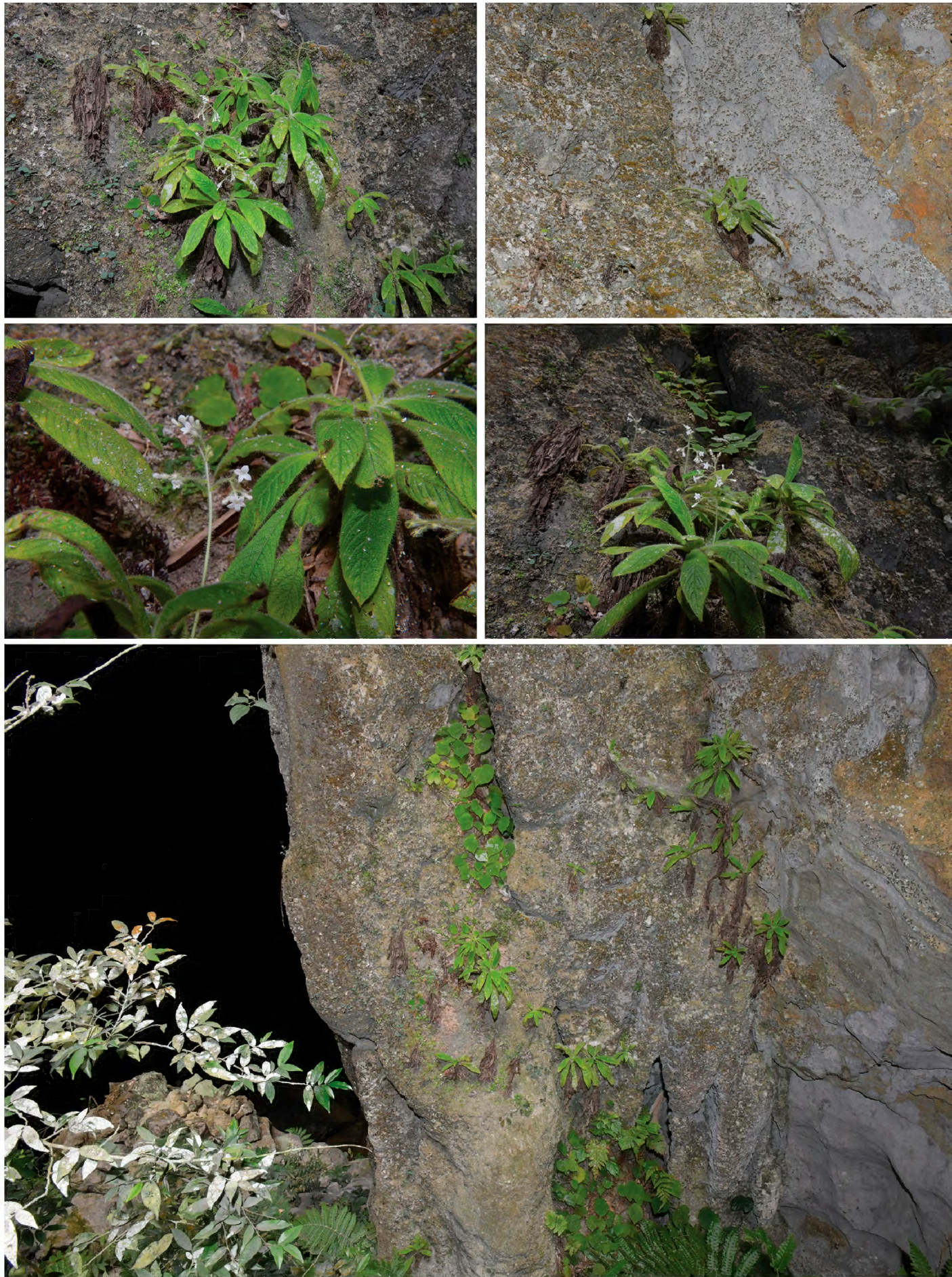


Figure 1. Habitat of *Spiradiclis yanii* Y.Nong & L.Wu on cliffs at the bottom of the sinkhole. Photographed by YN.

flat on both sides); stipules 2–4, linear or linear lanceolate, 4–8 mm, densely villous (vs. stipules persistent, triangular, 8–22 mm, tomentose); corolla tube 3 mm, sparsely pubescent inside (vs. tube 6–8 mm, glabrous inside); lobes 3–5 (vs. lobes 5); stamens arising at the base of the tube (vs. located at the throat of the corolla); stigma 2-lobed, lobes ovoid, slightly swollen, 0.2 mm (vs. stigma deeply bifid with linear lobes, 1–1.5 mm). At first glance, it also looks similar to *S. villosa* X. X. Chen & W. L. Sha, but differs by its leaves narrow elliptic or oblanceolate, 5–10 × 2–2.5 cm, densely villous adaxially and abaxially (vs. leaves oblong-elliptic or obovate-elliptic, 10–25 × 3–8 cm, adaxially dark brown pubescent, abaxially densely brown villous), petiole 0.5–1 cm (vs. petiole 3.5–7 cm), stipules 2–4, linear or linear lanceolate, 4–8 mm, densely villous (vs. stipules 2-lobed, densely dark brown villous, lobes lacinate, 15–30 mm). More detailed morphological differences amongst the three species are shown in Table 1.

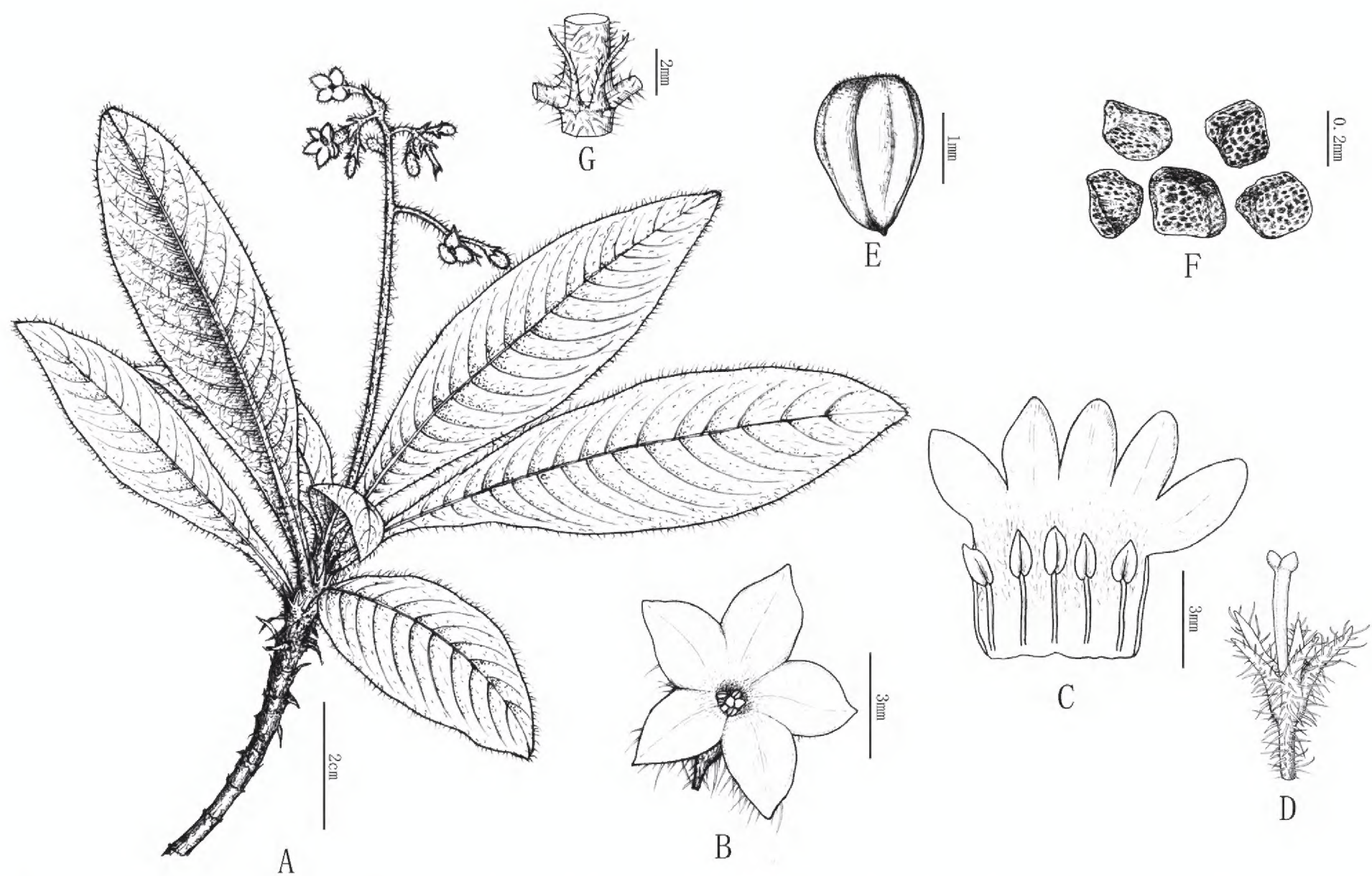


Figure 2. Line drawing of *Spiradiclis yanii* Y.Nong & L.Wu **A** flowering branch **B** flower **C** ovary and stigma **D** filaments of stamens and perianth **E** capsule **F** seeds **G** stipules (Drawn by Xin-cheng Qu).

Table 1. Main morphological differences amongst *Spiradiclis yanii*, *S. tomentosa* and *S. villosa*.

| Morphological traits | <i>S. yanii</i> | <i>S. tomentosa</i> | <i>S. villosa</i> |
|----------------------|---|---|--|
| Plant height | 5–25 cm | 3–23 cm | 30–50 cm |
| Stems | densely multicellular villous | densely grey-viscid multicellular tomentose | densely dark brown villous |
| Leaves | elliptic or oblanceolate, 5–10 × 2–3 cm | oblanceolate, obovate or rarely elliptic, 3.5–14 × 1.5–5 cm | oblong-elliptic or obovate-elliptic, 10–25 × 3–8 cm |
| Pedicel | 0.5–1 cm | 0.5–4.5 cm | 3.5–7 cm |
| Stipules | 2–4, linear or linear lanceolate, 4–8 mm, densely villous | persistent, triangular, 8–22 mm, tomentose | 2-lobed, lobes laciniate, 15–30 mm. densely dark brown villous |
| Corolla tube | 3 mm, sparsely pubescent inside | 6–8 mm, glabrous inside | Inflorescences and flowers not seen |
| Stamens | arising at the base of the tube, not protruding | arising at the throat of the corolla, slightly protruding | – |
| Style and stigma | style 2–3 mm, lobes ovoid, slightly swollen, 0.2 mm | style 6–7 mm, stigma is deeply bifurcated, lobes linear, 1–1.5 mm | – |
| Capsule | obovate, ca. 1 mm | subglobose, ca. 2 mm | ovoid, ca. 2 mm |

Holotype. CHINA • Guangxi: Longan, 23°03'03"N, 107°22'20"E, alt. 327 m, on the cliff at the bottom of a sinkhole, 7 March 2024, Y Nong NY2024030701 (GXMI) (holotype: GXMI!; isotypes: IBK!).

Description. Perennial herbs, erect, 5–25 cm tall, stems cylindrical, 1–2 branches, densely multicellular villous when young, but grabrous when old-;Leaves opposite, leaf blade drying membranous, narrow elliptic or oblanceolate,

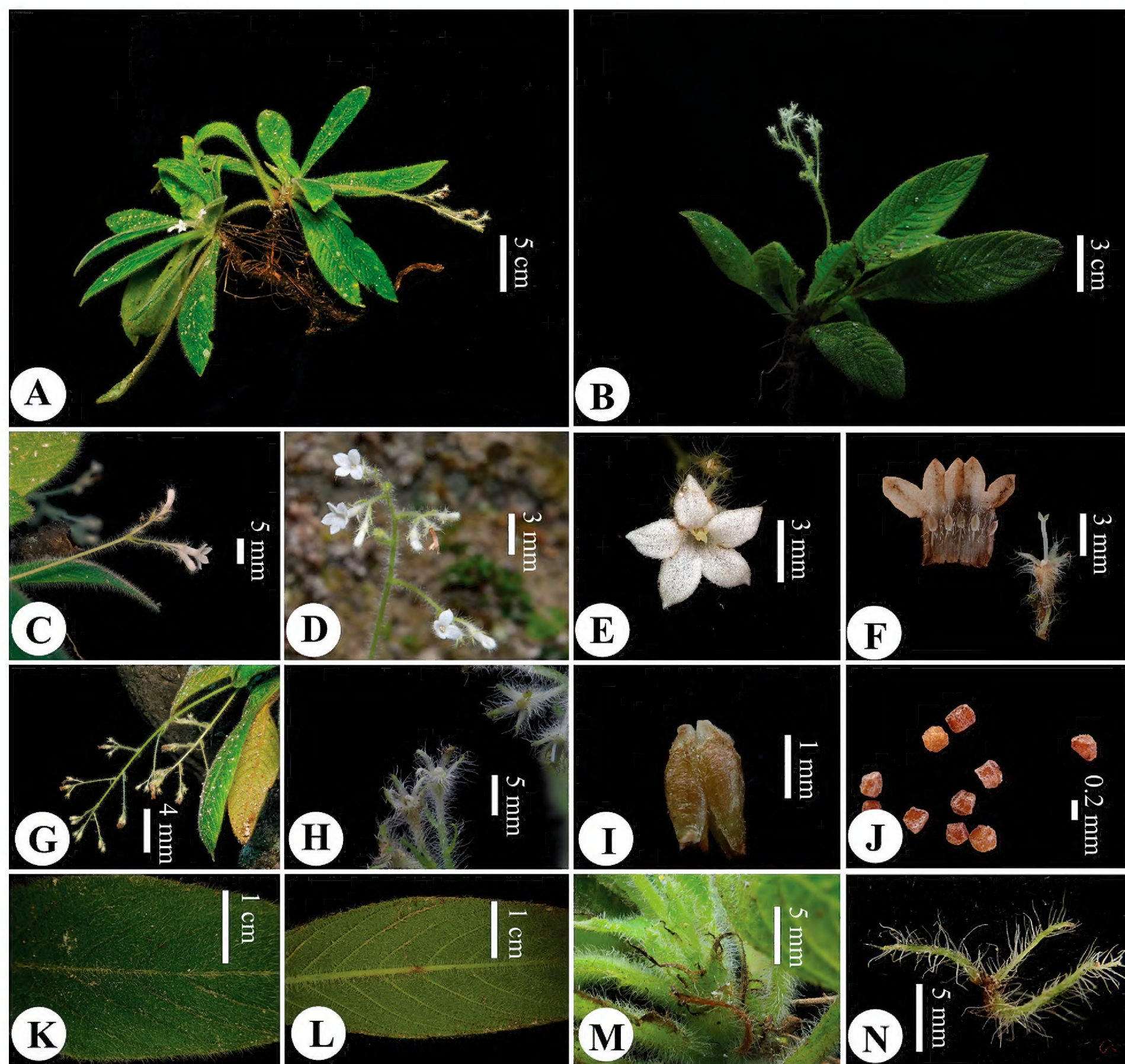


Figure 3. *Spiradiclis yanii* Y.Nong & L.Wu **A, B** plant (flowering and fruiting) **C** inflorescence (lateral view) **D** inflorescence (front view, corolla lobes 3–5) **E** flower (front view) **F** stamens, ovary and stigma **G** infructescence (lateral view) **H** calyx and bracts **I** capsule **J** seeds **K** leaf (adaxially view) **L** leaf (abaxially view) **M, N** stipules (Photographed by Ke-Jian Yan & You Nong, edited by You Nong).

5–10 × 2–2.5 cm, densely multicellular villous adaxially and abaxially, base cuneate or acute, apex acuminate or shortly acuminate, petiole 0.5–1 cm, densely villous; Mid-vein flat adaxially and convex abaxially, secondary veins 9–14 pairs; Stipules 2–4, linear or linear lanceolate, 4–8 mm, densely villous. Inflorescence terminal, paniculiform, peduncles 6–15 cm, densely villous, pedicels 3–6 mm, bracts linear, 3–7 mm; Hypanthium portion turbinate, 4 mm, calyx lobes 5, linear or narrow lanceolate, 1.5–2 mm; Flower homomorphism, corolla white, lobes 3–5, ovate, 2–3 mm, outside sparsely pubescent, glabrous inside, tube 3 mm, sparsely pubescent inside; Stamens 5, arising at the base of the tube, not protruding, glabrous, filaments 2 mm, anthers oblong, 0.5 mm; top of the ovary 4-lobed, sparsely pubescent; Ovary 2-loculed, with many ovules, style 2–3 mm, glabrous, stigma 2-lobed, lobes ovoid, slightly swollen, 0.2 mm;

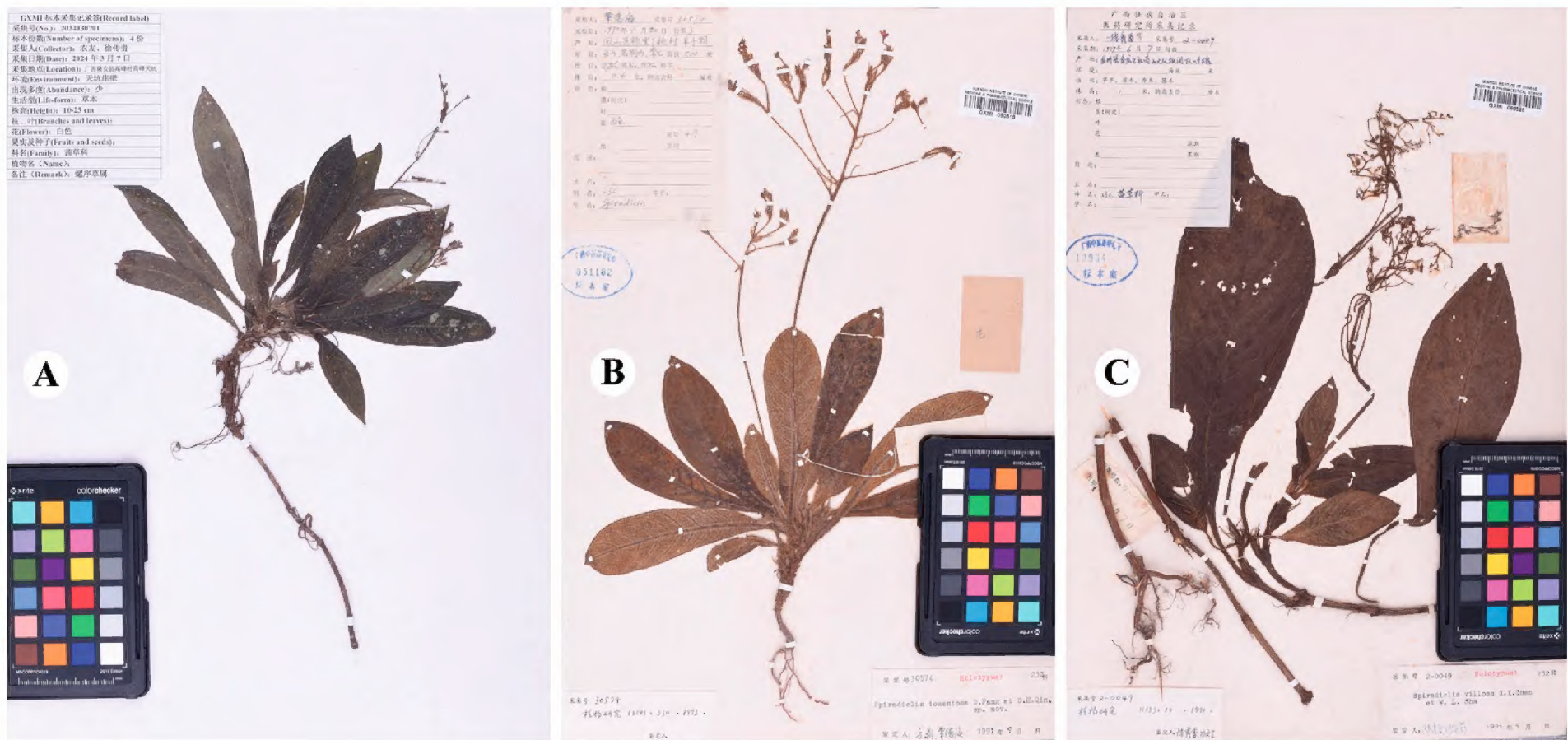


Figure 4. Digital images of type specimens **A** *Spiradiclis yanii* **B** *S. tomentosa* **C** *S. villosa*.



Figure 5. The distribution of *Spiradiclis yanii* (red circle) in Guangxi, China.

Capsule obovate, ca. 1 mm in diam., valves 4, persistent calyx lobes 2–4 mm; Seeds numerous, small and angular.

Phenology. Flowering and fruiting in February to March.

Etymology. The new species is named after Mr. Ke-Jian Yan, who worked in Guangxi Institute of Chinese Medicine & Pharmaceutical Science and made many contributions to GXMI, especially in Rubiaceae and Lamiaceae.

Distribution and habit. Known only from the southeast of Guangxi, China. It has been mainly found on cliffs at the bottom of a sinkhole at elevations of 320 m.

IUCN red list category. Data available for the new species are still insufficient to assess its conservation status. According to the IUCN Criteria (IUCN 2022), it is considered Data Deficient (DD) until more information becomes available. Although *S. yanii* currently has relatively good growth, further collection and monitoring are necessary to allow more conclusive estimations about the rarity and vulnerability of the species. Therefore, special attention should be given to the conservation of the new species of *Spiradiclis*.

Additional specimen. Longan • Southeast Guangxi: limestone hills, 7 November 2011, J.C. Yang&Y.B. Liao TK028 (IBK!); Longan, 14 March 2024 Y Nong NY2024031401 (GXMI!).

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Additional information

Conflict of interest

The authors have declared that no competing interests exist.

Ethical statement

No ethical statement was reported.

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Author contributions

Data curation: YN. Funding acquisition: YN, CGX. Investigation: YN, CGX, YGW. Methodology: YN, LQL, YGW. Project administration: YN, ZYZ. Supervision: BF, LW. Visualisation: YN, LQL. Writing-original draft: YN. Writing-review and editing: YN

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Data availability

All of the data that support the findings of this study are available in the main text.

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